

REMARKS

Applicants respectfully request reconsideration of the present U.S. patent application. Claims 1, 2, 5, 6, 8, 9 and 11-19 stand rejected under 35 U.S.C. § 102. Claims 4, 7, 10 and 20 stand rejected under 35 U.S.C. § 103. Claims 1 and 11 have been amended. No claims have canceled or added. Therefore, claims 1, 2 and 4-20 remain pending.

Claim Rejections - 35 U.S.C. § 102Rejections of Claims 1, 2, 5, 6, 8, 9 and 11-19 based on Yamada

Claims 1, 2, 5, 6, 8, 9 and 11-19 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,198,853 issued to Yamada (*Yamada*). For at least the reasons set forth below, Applicants submit that claims 1, 2, 5, 6, 8, 9 and 11-19 are not anticipated by *Yamada*.

Amended claim 1 recites the following:

a waveguide layer provided over at least a portion of said substrate and said first cladding layer, at least a portion of said waveguide layer having a concentration of recombination centers in the range of about $1 \times 10^{16} \text{ cm}^{-3}$ to about $1 \times 10^{18} \text{ cm}^{-3}$, wherein said recombination centers are formed by doping said at least a portion of said waveguide layer with impurity atoms selected from the group consisting of iron, chromium, manganese and copper; ...

Yamada discloses a semiconductor optical modular device having an electrical isolating layer that is formed on the upper region of a first conductivity-type subcladding layer. See col. 9, lines 28-30. A semiconductor layer such as an iron-doped InP or undoped InP can substitute for the electrical isolating layer. See col. 9, lines 33-36.

In *Yamada*, the substitute for the electrical isolating layer is an iron-doped InP.

Yamada does not disclose that recombination centers are formed by doping at least a

portion of a waveguide layer. Consequently, *Yamada* fails to teach at least one limitation of claim 1. Thus, *Yamada* does not anticipate the invention in claim 1 for at least the reasons set forth above. Applicants therefore respectfully request that the Examiner withdraw the rejection of claim 1 under 35 U.S.C. § 102.

Claims 2, 5, 6 and 8 depend from claim 1. Because dependent claims include the limitations of the claims from which they depend, Applicants submit that claims 2, 5, 6 and 8 are not anticipated by *Yamada* for at least the reasons set forth above.

Claim 9 recites the following:

a waveguide layer of said at least one tuning region provided over at least a portion of said substrate and said cladding layer, said waveguide layer having a thickness of about 2,000 Angstroms, and at least 100 Angstroms of said waveguide layer having a concentration of recombination centers in the range of about $1 \times 10^{16} \text{ cm}^{-3}$ to about $1 \times 10^{18} \text{ cm}^{-3}$

Amended claim 11 recites similar limitations.

Yamada discloses that the semiconductor optical modular device's first conductivity-type subcladding layer, second conductivity-type subcladding layer and first conductivity-type cladding layer have carrier concentrations of the $5 \times 10^{17} \text{ cm}^{-3}$, while its ohmic contact layer has a carrier concentration of $1 \times 10^{18} \text{ cm}^{-3}$. See col. 9, lines 41-50. *Yamada* also discloses that a waveguide layer of the semiconductor optical modular device has a film thickness of 0.2 to 0.3 μm . See col. 9, lines 45-46.

Yamada does not disclose a waveguide layer having a concentration of recombination centers in the range of about $1 \times 10^{16} \text{ cm}^{-3}$ to about $1 \times 10^{18} \text{ cm}^{-3}$. Thus, *Yamada* fails to teach at least one limitation of claims 9 and 11. Consequently, *Yamada* does not anticipate the invention in claims 9 and 11 for at least the reasons set forth above. Applicants therefore respectfully request that the Examiner withdraw the rejection of claims 9 and 11 under 35 U.S.C. § 102.

Claims 12-19 depend from claim 11. Because dependent claims include the limitations of the claims from which they depend, Applicants submit that claims 12-19 are not anticipated by *Yamada* for at least the reasons set forth above.

Claim Rejections - 35 U.S.C. § 103

Rejections of Claims 4, 7, 10 and 20 based on *Yamada* and *Itagaki*

Claims 4, 7, 10 and 20 were rejected under 35 U.S.C. § 103 as being unpatentable over *Yamada* in view of U.S. Patent Number 5,912,475 issue to Itagaki et al. (*Itagaki*). For at least the reasons set forth below, Applicants submit that claims 4, 7, 10 and 20 are not rendered obvious by *Yamada* and *Itagaki*.

Applicants agree with the Examiner that *Yamada* fails to disclose the limitations of claims 4, 7, 10 and 20. However, Examiner contends that *Itagaki* discloses the limitations of claims 4, 7, 10 and 20. *Itagaki* discloses an optical semiconductor device having certain element isolation characteristics and modulation bandwidth. See Abstract.

As explained above, *Yamada* fails to disclose that recombination centers are formed by doping at least a portion of a waveguide layer, as recited in claim 1. As also explained above, *Yamada* does not disclose a waveguide layer having a concentration of recombination centers in the range of about $1 \times 10^{16} \text{ cm}^{-3}$ to about $1 \times 10^{18} \text{ cm}^{-3}$, as recited in claims 9 and 11. Examiner does not contend that *Itagaki* discloses these limitations of claim 1, claim 9 and claim 11. Thus, *Itagaki* fails to cure the deficiencies of *Yamada* pointed out by Applicants. Consequently, *Yamada* in view of *Itagaki* fails to teach or suggest at least one limitation of claim 1 and at least one limitation of claims 9 and 11. Therefore, claim 1, claim 9 and claim 11 are not rendered obvious by *Yamada* in view of *Itagaki*.

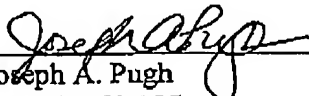
Claims 4 and 7 depend from claim 1. Claim 10 depends from claim 9. Claim 20 depends from claim 11. Because dependent claims include the limitations of the claims from which they depend, Applicants submit that claims 4, 7, 10 and 20 are not rendered obvious by *Yamada* in view of *Itagaki* for at least the reasons set forth above. Applicants therefore respectfully request that the Examiner withdraw the rejection of claims 4, 7, 10 and 20 under 35 U.S.C. § 103.

CONCLUSION

For at least the foregoing reasons, Applicants submit that the rejections have been overcome. Therefore, claims 1, 2 and 4-20 are in condition for allowance and such action is respectfully solicited. The Examiner is respectfully requested to contact the undersigned by telephone if such contact would further the examination of the present application.

Respectfully submitted,

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